

## Fire and site effects on grasses outplanted into longleaf pine groundcover

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**ABSTRACT:** Outplanting of nursery grown seedlings is a common method of plant community restoration. When restoring longleaf pine savannas and woodlands it is important to understand effects of habitat, prescribed fire treatments, and interactions thereof, on success of outplanted seedlings. Whereas much information is available on these topics for longleaf pine itself, much less information is available for groundcover plants.

As part of a long-term study of prescribed fire effects on longleaf pine groundcover in the Francis Marion National Forest, we have been monitoring outplanted seedlings of dominant grasses in relation to habitat (wet, mesic, and dry) and fire regime (fire treatments vary in frequency, season, and regularity). Two different "cohorts" of grasses have been outplanted, the first in winter 1994, the second in spring 1997. The first cohort consisted of 8 month old wiregrass and toothache grass plugs. The second cohort consisted of 2 year old seedlings of wiregrass (2 types that differed with respect to seed source), toothache grass, and Indian grass. In both cases, seedlings were outplanted into subplots ( $n=3$ ) randomly located within the main fire treatment plots. Eight seedlings of each species were outplanted into each subplot (i.e.  $n=24$  seedlings for each species for each main plot as a whole). The first cohort was outplanted into 21 main fire plots, 7 at each site. The second cohort was outplanted into a second set of 21 plots (there are a total of 63 main plots in all three sites).

Four years after outplanting, results for cohort #1 indicate distinct differences among species, habitats, and fire treatments. There are also some obvious interactions among these factors. Wiregrass survival has been consistently greater than toothache grass survival in all habitats over the entire course of the study. As might be expected, toothache grass, which is a grass of wet savannas, performed especially poorly in the dry habitat; as of spring 1998, toothache grass survival averaged 14.8% in this habitat as compared to 53% at the mesic site and 60.5% at the wet site. Comparable numbers for wiregrass at the three habitats, were 46.1%, 77.8%, and 78.1% for dry, mesic, and wet habitats, respectively. Though wiregrass survival at the dry site was considerably greater than that of toothache grass, results for both species were consistent in indicating the negative impact of limited soil moisture on plug survival.

Importance value (IV) was defined for each plant as no. of tillers X length of longest tiller (cm) X width of broadest tiller. On a subplot basis, IV was defined as the sum of all individual plant IV's. Thus IV was a convenient synthetic measure, integrating effects of density and various aspects of plant size. IV results for toothache grass for 1998 were statistically significant ( $P < .05$ ), and demonstrated a positive relationship with fire frequency (i.e., importance increased with higher fire frequencies; frequencies ranged from once every 6 years to once every 2 years). Wiregrass also exhibited this pattern at the wet site, but results from the other two sites were different. Wiregrass importance at these sites was greatest at the intermediate disturbance frequency (4 year average fire return time). These results indicate that interactive effects of competition and fire regime on species abundance differ between species and across edaphic gradients.

Results to date for cohort #2 resemble the early results for cohort #1. Survival has been initially high in all plots, but trends in survival and growth similar to cohort #1 may be starting to develop.



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